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CLAIMS

[Claim(s)]
[Claim 1]While photoing a landscape image near [in an experiencing person's sight line direction] a planned construction site, Send an experiencing person's position information and sight line direction information to a control means, and computer graphic model data of a structure built in the above-mentioned planned construction site is changed into image data corresponding to an experiencing person's position and a sight line direction, Create a computer graphical image of the above-mentioned structure which masked a background, and distance from an experiencing person's position to a structure is calculated in a computer graphic of the above-mentioned structure after that, Distance to a realistic object in a scene corresponding in a computer graphic of the above-mentioned structure is compared with distance to the above-mentioned structure, A field judged that the above-mentioned realistic object exists in the experiencing person side from a construction predetermined position of a structure in a field of a computer graphic of the above-mentioned structure is masked, A method for carrying out the virtual experience of the scene in the state where a structure was built in a planned construction site characterized by treating as transparent a portion masked in a computer graphical image of the above-mentioned structure, compounding the above-mentioned landscape image, and making it display.
[Claim 2]An image photographing means for photoing a landscape image near [in an experiencing person's sight line direction] a planned construction site, A position detecting means for detecting an experiencing person's position information, and a direction finding system for detecting an experiencing person's sight line direction information, A depth detection means for detecting distance from an experiencing person to a realistic object in the above-mentioned scene, Computer graphic model data of a structure built in the above-mentioned planned construction site based on an experiencing person's position information and sight line direction information is changed into image data corresponding to an experiencing person's position and a sight line direction, While creating a computer graphical image of the above-mentioned structure which masked a background, In a computer graphic of the above-mentioned structure, distance from an experiencing person's position to a structure is calculated, Input distance to a realistic object in a scene corresponding in a computer graphic of the above-mentioned structure from the above-mentioned depth detection means, and distance to the realistic object concerned is compared with distance to the above-mentioned structure, A control means which creates a computer graphical image of a structure which masked a field judged that the above-mentioned realistic object exists in the experiencing person side from a construction predetermined position of a structure in a field of a computer graphic of the above-mentioned structure, An image compositing means which treats as transparent a portion masked in a computer graphical image of the above-mentioned structure, and compounds the above-mentioned landscape image, A device for carrying out the virtual experience of the scene in the state where a structure was built in a planned construction site by which it is having-displaying means which displays image composing compounded by this image compositing means characterized.
[Claim 3]A method according to claim 1 or 2 or a device, wherein the above-mentioned control means changes this shadow while giving a shadow to a computer graphic of a structure based on

date information.
[Claim 4]A method according to claim 1, 2, or 3 or a device, wherein the above-mentioned control means changes these shade and shadow while attaching shade and shadow to a computer graphic of a structure based on illuminance information.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]When this invention performs scene examination in environmental assessment, etc., it relates to the method or device which could be made to carry out the virtual experience of the scene in the state where the structure was built in the planned construction site, a priori there.
[0002]
[Description of the Prior Art]Usually, when scene examination was performed, computer graphic (henceforth CG) animation, a photo montage, etc. were used, and a screen (video) and printed matter were performing.
[0003]
[Problem(s) to be Solved by the Invention]However, conventionally, since it was not directly carried out at the spot when [almost all] scene examination was performed, the virtual experience (viewing) of the scene of the state after the structure was built at the spot which performs scene examination could not be carried out directly, and realistic examination was not able to be performed.
[0004]
[Means for Solving the Problem]While a method of this invention photos a landscape image near [in an experiencing person's sight line direction] a planned construction site, Send an experiencing person's position information and sight line direction information to a control means, and CG model data of a structure built in the above-mentioned planned construction site is changed into image data corresponding to an experiencing person's position and a sight line direction, Create CG image of the above-mentioned structure which masked a background, and distance from an experiencing person's position to a structure is calculated in CG of the above-mentioned structure after that, Distance to a realistic object in a scene corresponding in CG of the above-mentioned structure is compared with distance to the above-mentioned structure, In a field of CG of the above-mentioned structure, a portion which masked a field judged that the above-mentioned realistic object exists in the experiencing person side from a construction predetermined position of a structure, and was masked in CG image of the above-mentioned structure is treated as transparent, the above-mentioned landscape image is compounded, and it was made to display. An image photographing means for a device of this invention to photo a landscape image near [in an experiencing person's sight line direction] a planned construction site, A position detecting means for detecting an experiencing person's position information, and a direction finding system for detecting an experiencing person's sight line direction information, A depth detection means for detecting distance from an experiencing person to a realistic object in the above-mentioned scene, CG model data of a structure built in the above-mentioned planned construction site based on an experiencing person's position information and sight line direction information is changed into image data corresponding to an experiencing person's position and a sight line direction, While creating CG image of the above-mentioned structure which masked a background, In CG of the above-mentioned structure, distance from an experiencing person's position to a structure is calculated, Input distance to a realistic object in

a scene corresponding in CG of the above-mentioned structure from the above-mentioned depth detection means, and distance to the realistic object concerned is compared with distance to the above-mentioned structure, A control means which creates CG image of a structure which masked a field judged that the above-mentioned realistic object exists in the experiencing person side from a construction predetermined position of a structure in a field of CG of the above-mentioned structure, An image compositing means which treats as transparent a portion masked in CG image of the above-mentioned structure, and compounds the above-mentioned landscape image, It had a displaying means which displays image composing compounded by this image compositing means. According to a method and a device of this invention, a scene before and behind a structure which is due to be built, and this structure is compoundable with reality.
[0005]
[Embodiment of the Invention]First, the outline of the virtual experience device by the embodiment of the invention 1 is explained based on drawing 1. 1 is an image photographing apparatus for always photoing the landscape image near [in an experiencing person's sight line direction] a planned construction site, for example, the camera using a CCD element is used. 2 is a position sensing device for always detecting an experiencing person's three-dimensional position information (X, Y, Z data), for example, GPS devices, such as RTK(real-time kinematic)-GPS and D(differential)-GPS, are used. 3 is a direction finding system for always detecting an experiencing person's sight line direction information (an experiencing person's look azimuth data and look elevation angle data), For example, an acceleration sensor, what detects a sight line direction combining a gravity sensor, the magnetic sensor which detects a sight line direction using a magnetic field (magnetic field), etc. are used. The non prism range finder (laser scanning device) which 4 is a depth sensing device which detects the depth information (distance data from an experiencing person to each realistic object in a scene) of the realistic object in the scene which an experiencing person views, for example, measures distance by a reflected wave is used. What is necessary is just to be able to measure this non prism range finder by directing the candidate for measurement, even if there is no target although the direction of what is measured using a target is accurate. 5 is a personal computer (henceforth a personal computer) as a control device, and structure image display software is incorporated. The three-dimensional CG model data of the structure built in the planned construction site in a virtual experience person's sight line direction is beforehand inputted into this personal computer 5. As model data, CG pattern of various structures which are due to be built, the three-dimensional position information on a structure, etc. are inputted beforehand. The chroma keyer which 6 is an image compositing device, for example, treats as transparent the color of the range which inputted two video signals and was specified among one video signal, and compounds it to the 2nd video signal is used. 7 is a display which displays the picture combined by the image compositing device 6, for example, HMD (head mount display device) is used. The image signal converter from which 1a changes a picture signal into a video signal, the controller by which 3a controls the output timing of sight line direction information to the personal computer 5, The controller by which 4a controls the output timing of depth information to the personal computer 5, the down converter from which 5a changes the data of CG into a video signal, and 6a are display controllers which control the display 7. The cable is made to perform the signal transmission of a picture signal and a sight line direction, a position, and depth information (data). The devices 1, 2, 3, 4, and 7 are attached to an experiencing person's head.
[0006]Next, operation of a virtual experience device is explained based on drawing 2 - drawing 6.

(1) As shown in drawing 2, always acquire the landscape image A of an experiencing person's sight line direction with the image photographing apparatus 1.
(2) The three-dimensional position information of the experiencing person always acquired with the position sensing device 2 and an experiencing person's sight line direction information always acquired with the direction finding system 3 are simultaneously sent to the personal computer 5. Structure image display software changes into the image data corresponding to the experiencing person's position and sight line direction the CG model data of the structure which is due to be built based on these information, and displays it on the display 7. For example, as shown in

drawing 3, the CG image B of the tank T as a structure which is due to be built is created, and it displays on real time (when an experiencing person's position and sight line direction change, the size and display position of CG change). In this case, there is the necessity (it resets) of coinciding the starting point of the CG image B and the starting point of the position sensing device 2, and deciding them beforehand. The background C of the CG image B is used as masking. That is, in order to treat as behind transparent, it distinguishes by a different color from the color of CG of the tank T (for example, if the color of CG of the tank T is gray, the background will be made blue and will treat this blue portion as transparent behind).
(3) Next, by structure image display software, calculate the outline of CG of the above-mentioned tank T, and calculate the context of a background and CG to the field in this outline. That is, in CG of the above-mentioned tank T, the distance from an experiencing person's position to the outline of the tank which is a construction schedule is calculated. And the distance data to the realistic object in a scene corresponding with the depth sensing device 4 in the outline of CG of the above-mentioned tank T is acquired, this distance data is sent to the personal computer 5, and it compares with the distance to the above-mentioned outline. The front face D which assumed the case where the experiencing person I looked at the tank T which is a actual construction schedule will be displayed, and CG of the tank T will call it the distance from the experiencing person I to each portion of the front face D of the above with the distance to the above-mentioned outline, as shown in drawing 4. That is, in the personal computer 5, the distance to the front face D of the tank of the imagination which is in agreement with an experiencing person's sight line direction F is compared with the distance of the realistic object located in the front or back from this front face D, and the context is grasped. For example, if the realistic object in which the realistic object located ahead of the tank T which is a actual construction schedule is located in tree JF and back is the tree JB and the personal computer 5 compares the distance to Xa, Fa, Xb, and Fb of drawing 4, it turns out that tree JF which is a realistic object is located ahead. If the personal computer 5 compares the distance to Xa, Ba, Xb, and Bb, it turns out that the tree JB which is a realistic object is located back. Actual scene within the limits which controls the measurement direction of the depth sensing device 4 based on the model data (three-dimensional position information) of CG of the tank T, and specifically corresponds in CG field of the tank T is made to scan sequentially. That is, the distance data to the actual realistic object equivalent to the position of each pixel of CG is incorporated one by one, and the successive approximation is carried out to the corresponding distance data to each portion of the front face D of CG. And CG (same blue as CG background was used) image which masked the CG field X of the tank T judged that the above-mentioned realistic object exists in a near side (experiencing person I side) from the construction predetermined position of a tank in the field of CG of the above-mentioned tank T is created (drawing 5).
The landscape image A of an experiencing person's sight line direction acquired by (4) and (1) (drawing 2) and CG image (drawing 5) to which masking was added by (3) are compounded. That is, by the image compositing device 6, the masking portion (blue portion) of CG image (drawing 5) is treated as transparent, the landscape image A is compounded, and the image composing Z like drawing 6 is displayed on the display 7. Namely, the object (the left-hand side of drawing 2 and the building a of 5 part, the building b of drawing 2) located behind the tank T hides by CG of the tank T, The image composing Z compounded so that the object (drawing 2, the building c of 5, the trees d) located in the near side of the tank T might hide a part of CG of the tank T will be displayed on the display 7.
[0007]Therefore, the scene before and behind the structure which is due to be built, and this structure can be compounded with reality, and it comes to be able to perform a real virtual experience (viewing). Since he is trying to display continuously the picture (drawing 2, 3, 5, 6) which processed above-mentioned (1) - (4) to the display 7 of the experiencing person head on real time, it comes to be able to perform the virtual experience which has a real feeling there. Since it ends with comparison of only a realistic object located in actual corresponding in outline of CG scene within the limits when performing distance comparison of the realistic object in a scene, and CG, it is not necessary to perform distance measurement of the whole scene,

distance measurement and the throughput of distance comparison are reduced, and processing efficiency is good.
[0008]While calculating the position of light sources, such as the sun, and giving the shadow S1 to CG of a structure by inputting date information into the personal computer 5 based on the position of said light source, If it is made to change the shadow S1 with change of time, a real feeling can be taken out to CG of a structure and CG can be brought close to the actual thing. While attaching shade and shadow (shade of a shadow) also in the portion to which light strikes upon CG of the structure in consideration of the surroundings lump of light by acquiring illuminance information with an illuminometer etc. and inputting this illuminance information into the personal computer 5, If it is made to change these shade and shadow with change of illumination, a real feeling can be taken out by CG of a structure and CG of a structure can be brought more close to the actual thing. In this case, what is necessary is to input beforehand the model data of a shadow or shade and shadow to various structures into the personal computer 5, and just to process change of the shadow by change of date information and illuminance information, or shade and shadow by software. Since a virtual experience can be carried out still with reality according to the above, still more realistic examination can be performed.
[0009]Although the data of a picture signal and a sight line direction, a position, etc. is always acquired and he is trying to display a picture on the display 7 continuously above in real time, when required, data is acquired once and, of course, it may be made to display a picture each time.
[0010]Without forming the depth sensing device 4 for exclusive use, as shown in drawing 7, the two image photographing apparatus 1A and 1B may be prepared, and it may constitute so that the azimuth difference of two pictures may detect depth. In this case, the depth calculation software by image processing is built into the personal computer 5A.
[0011]As the position sensing device 2, a followed type total station other than a GPS device, etc. can also be used. A marker etc. are fixed to the described image photographing instrument 1 or the display 7, and it may be made for calculation to detect the present virtual experience person's sight line direction from the physical relationship of the marker within a picture by reading into the personal computer 5 by making it into picture information, without using the direction finding system 3 for exclusive use. As the image compositing device 6, use TEROPPA which treats the specified color (monochrome) as transparent besides a chroma keyer, and compounds CG of the personal computer 5 to a video signal, or, Or it may be made to combine two pictures by the same processing as a chroma keyer or TEROPPA using the video input output function added to the personal computer 5. As the display 7, a notebook sized personal computer etc. may be used as FMD (face mount display device) or a movable display besides HMD. It may be made to transmit a picture and a direction, a position, and depth information (data) by radio other than transmission by a cable as a signal-transmission method. It may be made to transmit the above-mentioned data digitally using cable LAN or wireless LAN. It is not necessary to necessarily attach the image photographing apparatus 1 (1A, 1B), the direction finding system 3, the position sensing device 2, the depth sensing device 4, and the display 7 to a head. For example, these may all be made to unite with a personal computer, and it is good only also considering an image photographing apparatus as a different body. What is necessary is in short, just to be able to detect direction of an image photographing apparatus. A CCD camera etc. may be attached to a telescope or binoculars and an image photographing apparatus may be constituted.
[0012]
[Effect of the Invention]As mentioned above, according to this invention, at the spot of a planned construction site, since the virtual experience (viewing) of the scene in the state where the structure was built can be carried out directly and the virtual experience of the scene before and behind a structure can be carried out with reality, realistic examination can be performed. Since it is not necessary to perform distance measurement of the whole scene, distance measurement and the throughput of distance comparison are reduced and processing efficiency is good. While giving a shadow to CG of a structure based on date information, making it change this shadow or attaching shade and shadow to CG of a structure based on illuminance

information, Since a virtual experience can be carried out still with reality by making it change these shade and shadow, still more realistic examination can be performed.

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TECHNICAL FIELD

[Field of the Invention]When this invention performs scene examination in environmental assessment, etc., it relates to the method or device which could be made to carry out the virtual experience of the scene in the state where the structure was built in the planned construction site, a priori there.

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PRIOR ART

[Description of the Prior Art]Usually, when scene examination was performed, computer graphic (henceforth CG) animation, a photo montage, etc. were used, and a screen (video) and printed matter were performing.

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EFFECT OF THE INVENTION

[Effect of the Invention]As mentioned above, in this invention, at the spot of a planned construction site, the virtual experience (viewing) of the scene in the state where the structure was built can be carried out directly, and the virtual experience of the scene before and behind a structure can be carried out with reality.
Therefore, realistic examination can be performed.
Since it is not necessary to perform distance measurement of the whole scene, distance measurement and the throughput of distance comparison are reduced and processing efficiency is good. While giving a shadow to CG of a structure based on date information, making it change this shadow or attaching shade and shadow to CG of a structure based on illuminance information, Since a virtual experience can be carried out still with reality by making it change these shade and shadow, still more realistic examination can be performed.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]However, conventionally, since it was not directly carried out at the spot when [almost all] scene examination was performed, the virtual experience (viewing) of the scene of the state after the structure was built at the spot which performs scene examination could not be carried out directly, and realistic examination was not able to be performed.

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MEANS

[Means for Solving the Problem]While a method of this invention photos a landscape image near [in an experiencing person's sight line direction] a planned construction site, Send an experiencing person's position information and sight line direction information to a control means, and CG model data of a structure built in the above-mentioned planned construction site is changed into image data corresponding to an experiencing person's position and a sight line direction, Create CG image of the above-mentioned structure which masked a background, and distance from an experiencing person's position to a structure is calculated in CG of the above-mentioned structure after that, Distance to a realistic object in a scene corresponding in CG of the above-mentioned structure is compared with distance to the above-mentioned structure, In a field of CG of the above-mentioned structure, a portion which masked a field judged that the above-mentioned realistic object exists in the experiencing person side from a construction predetermined position of a structure, and was masked in CG image of the above-mentioned structure is treated as transparent, the above-mentioned landscape image is compounded, and it was made to display. An image photographing means for a device of this invention to photo a landscape image near [in an experiencing person's sight line direction] a planned construction site, A position detecting means for detecting an experiencing person's position information, and a direction finding system for detecting an experiencing person's sight line direction information, A depth detection means for detecting distance from an experiencing person to a realistic object in the above-mentioned scene, CG model data of a structure built in the above-mentioned planned construction site based on an experiencing person's position information and sight line direction information is changed into image data corresponding to an experiencing person's position and a sight line direction, While creating CG image of the above-mentioned structure which masked a background, In CG of the above-mentioned structure, distance from an experiencing person's position to a structure is calculated, Input distance to a realistic object in a scene corresponding in CG of the above-mentioned structure from the above-mentioned depth detection means, and distance to the realistic object concerned is compared with distance to the above-mentioned structure, A control means which creates CG image of a structure which masked a field judged that the above-mentioned realistic object exists in the experiencing person side from a construction predetermined position of a structure in a field of CG of the above-mentioned structure, An image compositing means which treats as transparent a portion masked in CG image of the above-mentioned structure, and compounds the above-mentioned landscape image, It had a displaying means which displays image composing compounded by this image compositing means. According to a method and a device of this invention, a scene before and behind a structure which is due to be built, and this structure is compoundable with reality.
[0005]
[Embodiment of the Invention]First, the outline of the virtual experience device by the embodiment of the invention 1 is explained based on drawing 1. 1 is an image photographing apparatus for always photoing the landscape image near [in an experiencing person's sight line direction] a planned construction site, for example, the camera using a CCD element is used. 2 is a position sensing device for always detecting an experiencing person's three-dimensional position information (X, Y, Z data), for example, GPS devices, such as RTK(real-time kinematic)-

GPS and D(differential)-GPS, are used. 3 is a direction finding system for always detecting an experiencing person's sight line direction information (an experiencing person's look azimuth data and look elevation angle data), For example, an acceleration sensor, what detects a sight line direction combining a gravity sensor, the magnetic sensor which detects a sight line direction using a magnetic field (magnetic field), etc. are used. The non prism range finder (laser scanning device) which 4 is a depth sensing device which detects the depth information (distance data from an experiencing person to each realistic object in a scene) of the realistic object in the scene which an experiencing person views, for example, measures distance by a reflected wave is used. What is necessary is just to be able to measure this non prism range finder by directing the candidate for measurement, even if there is no target although the direction of what is measured using a target is accurate. 5 is a personal computer (henceforth a personal computer) as a control device, and structure image display software is incorporated. The three-dimensional CG model data of the structure built in the planned construction site in a virtual experience person's sight line direction is beforehand inputted into this personal computer 5. As model data, CG pattern of various structures which are due to be built, the three-dimensional position information on a structure, etc. are inputted beforehand. The chroma keyer which 6 is an image compositing device, for example, treats as transparent the color of the range which inputted two video signals and was specified among one video signal, and compounds it to the 2nd video signal is used. 7 is a display which displays the picture combined by the image compositing device 6, for example, HMD (head mount display device) is used. The image signal converter from which 1a changes a picture signal into a video signal, the controller by which 3a controls the output timing of sight line direction information to the personal computer 5, The controller by which 4a controls the output timing of depth information to the personal computer 5, the down converter from which 5a changes the data of CG into a video signal, and 6a are display controllers which control the display 7. The cable is made to perform the signal transmission of a picture signal and a sight line direction, a position, and depth information (data). The devices 1, 2, 3, 4, and 7 are attached to an experiencing person's head.
[0006]Next, operation of a virtual experience device is explained based on drawing 2 - drawing 6.

(1) As shown in drawing 2, always acquire the landscape image A of an experiencing person's sight line direction with the image photographing apparatus 1.
(2) The three-dimensional position information of the experiencing person always acquired with the position sensing device 2 and an experiencing person's sight line direction information always acquired with the direction finding system 3 are simultaneously sent to the personal computer 5. Structure image display software changes into the image data corresponding to the experiencing person's position and sight line direction the CG model data of the structure which is due to be built based on these information, and displays it on the display 7. For example, as shown in drawing 3, the CG image B of the tank T as a structure which is due to be built is created, and it displays on real time (when an experiencing person's position and sight line direction change, the size and display position of CG change). In this case, there is the necessity (it resets) of coinciding the starting point of the CG image B and the starting point of the position sensing device 2, and deciding them beforehand. The background C of the CG image B is used as masking. That is, in order to treat as behind transparent, it distinguishes by a different color from the color of CG of the tank T (for example, if the color of CG of the tank T is gray, the background will be made blue and will treat this blue portion as transparent behind).
(3) Next, by structure image display software, calculate the outline of CG of the above-mentioned tank T, and calculate the context of a background and CG to the field in this outline. That is, in CG of the above-mentioned tank T, the distance from an experiencing person's position to the outline of the tank which is a construction schedule is calculated. And the distance data to the realistic object in a scene corresponding with the depth sensing device 4 in the outline of CG of the above-mentioned tank T is acquired, this distance data is sent to the personal computer 5, and it compares with the distance to the above-mentioned outline. The front face D which assumed the case where the experiencing person I looked at the tank T which is a actual construction schedule will be displayed, and CG of the tank T will call it the

distance from the experiencing person I to each portion of the front face D of the above with the distance to the above-mentioned outline, as shown in drawing 4. That is, in the personal computer 5, the distance to the front face D of the tank of the imagination which is in agreement with an experiencing person's sight line direction F is compared with the distance of the realistic object located in the front or back from this front face D, and the context is grasped. For example, if the realistic object in which the realistic object located ahead of the tank T which is a actual construction schedule is located in tree JF and back is the tree JB and the personal computer 5 compares the distance to Xa, Fa, Xb, and Fb of drawing 4, it turns out that tree JF which is a realistic object is located ahead. If the personal computer 5 compares the distance to Xa, Ba, Xb, and Bb, it turns out that the tree JB which is a realistic object is located back. Actual scene within the limits which controls the measurement direction of the depth sensing device 4 based on the model data (three-dimensional position information) of CG of the tank T, and specifically corresponds in CG field of the tank T is made to scan sequentially. That is, the distance data to the actual realistic object equivalent to the position of each pixel of CG is incorporated one by one, and the successive approximation is carried out to the corresponding distance data to each portion of the front face D of CG. And CG (same blue as CG background was used) image which masked the CG field X of the tank T judged that the above-mentioned realistic object exists in a near side (experiencing person I side) from the construction predetermined position of a tank in the field of CG of the above-mentioned tank T is created (drawing 5).
The landscape image A of an experiencing person's sight line direction acquired by (4) and (1) (drawing 2) and CG image (drawing 5) to which masking was added by (3) are compounded. That is, by the image compositing device 6, the masking portion (blue portion) of CG image (drawing 5) is treated as transparent, the landscape image A is compounded, and the image composing Z like drawing 6 is displayed on the display 7. Namely, the object (the left-hand side of drawing 2 and the building a of 5 part, the building b of drawing 2) located behind the tank T hides by CG of the tank T, The image composing Z compounded so that the object (drawing 2, the building c of 5, the trees d) located in the near side of the tank T might hide a part of CG of the tank T will be displayed on the display 7.

[0007]Therefore, the scene before and behind the structure which is due to be built, and this structure can be compounded with reality, and it comes to be able to perform a real virtual experience (viewing). Since he is trying to display continuously the picture (drawing 2, 3, 5, 6) which processed above-mentioned (1) - (4) to the display 7 of the experiencing person head on real time, it comes to be able to perform the virtual experience which has a real feeling there. Since it ends with comparison of only a realistic object located in actual corresponding in outline of CG scene within the limits when performing distance comparison of the realistic object in a scene, and CG, it is not necessary to perform distance measurement of the whole scene, distance measurement and the throughput of distance comparison are reduced, and processing efficiency is good.

[0008]While calculating the position of light sources, such as the sun, and giving the shadow S1 to CG of a structure by inputting date information into the personal computer 5 based on the position of said light source, If it is made to change the shadow S1 with change of time, a real feeling can be taken out to CG of a structure and CG can be brought close to the actual thing. While attaching shade and shadow (shade of a shadow) also in the portion to which light strikes upon CG of the structure in consideration of the surroundings lump of light by acquiring illuminance information with an illuminometer etc. and inputting this illuminance information into the personal computer 5, If it is made to change these shade and shadow with change of illumination, a real feeling can be taken out by CG of a structure and CG of a structure can be brought more close to the actual thing. In this case, what is necessary is to input beforehand the model data of a shadow or shade and shadow to various structures into the personal computer 5, and just to process change of the shadow by change of date information and illuminance information, or shade and shadow by software. Since a virtual experience can be carried out still with reality according to the above, still more realistic examination can be performed.

[0009]Although the data of a picture signal and a sight line direction, a position, etc. is always

acquired and he is trying to display a picture on the display 7 continuously above in real time, when required, data is acquired once and, of course, it may be made to display a picture each time.
[0010]Without forming the depth sensing device 4 for exclusive use, as shown in drawing 7, the two image photographing apparatus 1A and 1B may be prepared, and it may constitute so that the azimuth difference of two pictures may detect depth. In this case, the depth calculation software by image processing is built into the personal computer 5A.
[0011]As the position sensing device 2, a followed type total station other than a GPS device, etc. can also be used. A marker etc. are fixed to the described image photographing instrument 1 or the display 7, and it may be made for calculation to detect the present virtual experience person's sight line direction from the physical relationship of the marker within a picture by reading into the personal computer 5 by making it into picture information, without using the direction finding system 3 for exclusive use. As the image compositing device 6, use TEROPPA which treats the specified color (monochrome) as transparent besides a chroma keyer, and compounds CG of the personal computer 5 to a video signal, or, Or it may be made to combine two pictures by the same processing as a chroma keyer or TEROPPA using the video input output function added to the personal computer 5. As the display 7, a notebook sized personal computer etc. may be used as FMD (face mount display device) or a movable display besides HMD. It may be made to transmit a picture and a direction, a position, and depth information (data) by radio other than transmission by a cable as a signal-transmission method. It may be made to transmit the above-mentioned data digitally using cable LAN or wireless LAN. It is not necessary to necessarily attach the image photographing apparatus 1 (1A, 1B), the direction finding system 3, the position sensing device 2, the depth sensing device 4, and the display 7 to a head. For example, these may all be made to unite with a personal computer, and it is good only also considering an image photographing apparatus as a different body. What is necessary is in short, just to be able to detect direction of an image photographing apparatus. A CCD camera etc. may be attached to a telescope or binoculars and an image photographing apparatus may be constituted.

[Translation done.]

* NOTICES *

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1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is a block lineblock diagram showing the composition of the device by the embodiment of the invention 1.
[Drawing 2]It is an explanatory view for explaining operation of the device by Embodiment 1.
[Drawing 3]It is an explanatory view for explaining operation of the device by Embodiment 1.
[Drawing 4]It is an explanatory view for explaining operation of the device by Embodiment 1.
[Drawing 5]It is an explanatory view for explaining operation of the device by Embodiment 1.
[Drawing 6]It is an explanatory view for explaining operation of the device by Embodiment 1.
[Drawing 7]It is a block lineblock diagram showing the composition of the device by other embodiments of this invention.
[Description of Notations]
1 An image photographing apparatus and 2 [A personal computer (control means) and 6 / An image compositing device and 7 / A display and A / A landscape image, a B CG image, and C / A background and Z / Image composing and S1 / Shadow.] A position sensing device and 3 A direction finding system and 4 A depth sensing device and 5

[Translation done.]

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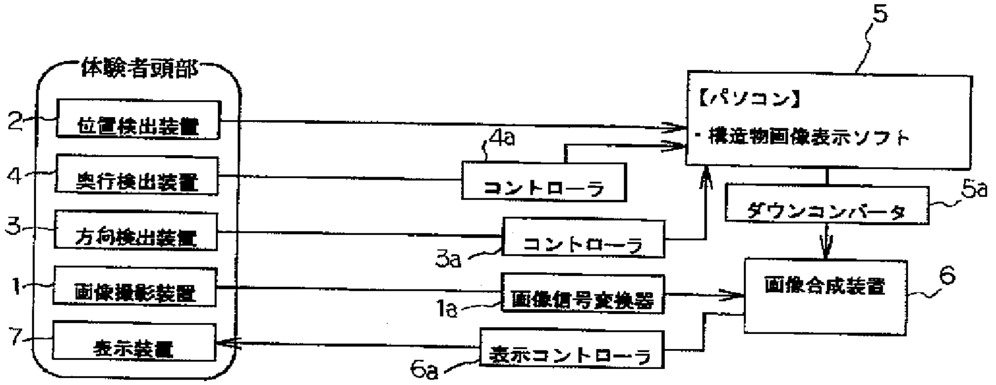
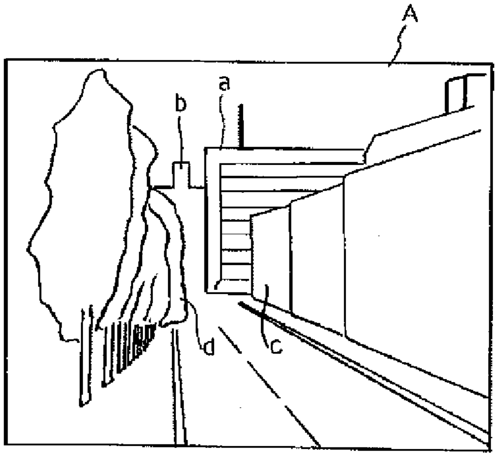
DRAWINGS

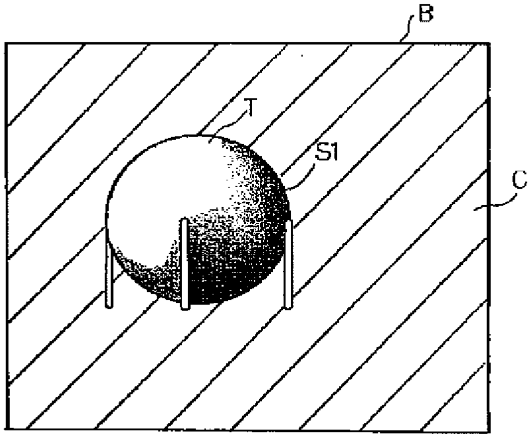
[Drawing 1]



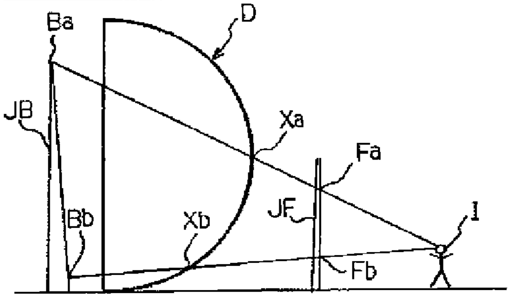
[Drawing 2]



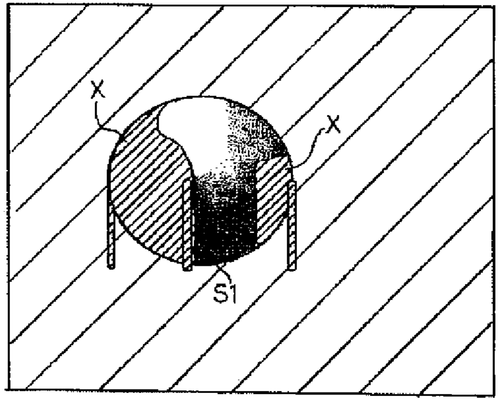
[Drawing 3]



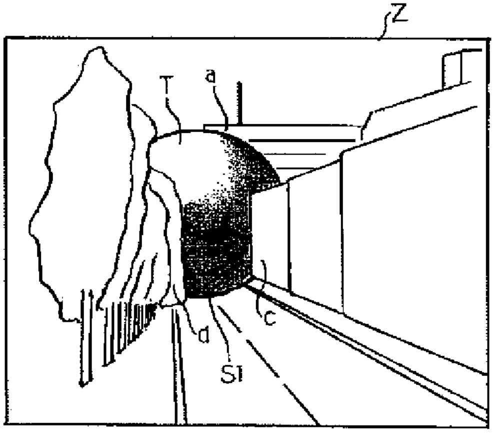
[Drawing 4]



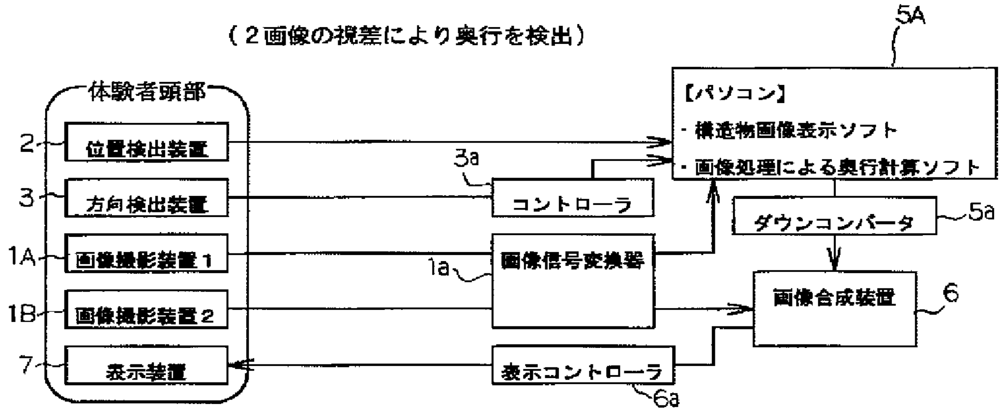
[Drawing 5]



[Drawing 6]



[Drawing 7]



[Translation done.]